WHAT IS CLAIMED IS:

1. A method for processing target material of a microstructure while avoiding undesirable changes to adjacent non-target material having a thermal or optical property different than the target material, the target material being characterized by a relationship of fluence breakdown threshold versus laser pulse width that exhibits a rapid and distinct change in slope at a characteristic laser pulse width, the method comprising:

generating a pulsed laser beam in which a first pulse of the beam has a pulse width equal to or less than the characteristic laser pulse width;

focusing the pulsed laser beam to obtain a focused beam; and

relatively positioning the focused beam into a spot on the target material wherein the first pulse removes all of the target material while avoiding undesirable change to the adjacent non-target material.

2. The method of claim 1, wherein the microstructure is a electrically conductive, redundant memory link.

3. The method as claimed in claim 2 wherein the link is part of a semiconductor memory device having links widths pitch less than about 1.33 microns.

4. The method as claimed in claim 2, wherein the link is supported on a silicon substrate, and wherein laser wavelength is greater than about 1 $\mu$m.

5. The method as claimed in claim 1, wherein the step of generating includes amplifying a seed pulse with a fiber optic amplifier.

6. The method as claimed in claim 4, wherein at least one absorbing material is located between the link and the substrate to prevent damage to at least one of the substrate and a link adjacent to the memory link.

7. The method as claimed in claim 6, wherein interaction of the absorbing material with the focused beam includes non-linear absorption of laser energy.

8. The method as claimed in claim 1, wherein the microstructure is a link supported on a substrate and wherein at least one sacrificial material is located between the link and the substrate.

9. The method as claimed in claim 8, wherein the substrate is a silicon substrate.

10. The method as claimed in claim 9, wherein laser wavelength is less than about 500 nm.

11. The method as claimed in claim 6, wherein the at least one absorbing material includes a sacrificial layer of material.

12. The method as claimed in claim 1, wherein energy density of the focused beam at the spot is greater than about 2 Joules/$cm^2$.

13. The method as claimed in claim 12, wherein the energy density is in a range of about 25-30 Joules/$cm^2$.

14. The method as claimed in claim 1, wherein the pulse width of the first pulse is less than about 10 ps.

15. The method as claimed in claim 1, wherein the pulse width of the first pulse is less than about 150 fs.

16. The method as claimed in claim 1, wherein the spot has a diameter less than about 1.6 microns.

17. A system for processing target material of a microstructure while avoiding undesirable changes to adjacent non-target material having a thermal or optical property different than the target material, the target material being characterized by a relationship of fluence breakdown threshold versus laser pulse width that exhibits a rapid and distinct change in slope at a characteristic laser pulse width, the system comprising:

means for generating a pulsed laser beam in which a first pulse of the beam has a pulse width equal to or less than the characteristic laser pulse width;

means for focusing the pulsed laser beam to obtain a focused beam; and

means for relatively positioning the focused beam into a spot on the target material wherein the first pulse removes all of the target material while avoiding undesirable change to the adjacent non-target material.

18. The system as claimed in claim 17, wherein the microstructure is an electrically conductive, redundant memory link.

19. The system as claimed in claim 18, wherein the means for generating includes:

an oscillator to generate a source pulse;

a pulse stretcher to stretch the source pulse to obtain a stretched pulse;

an optical amplifier for amplifying the stretched pulse to obtain an amplified pulse; and

a compressor for compressing the amplified pulse so as to produce the first pulse.

20. The system as claimed in claim 18, wherein the means for relatively positioning includes:

a positioning subsystem for relatively positioning the link and the focused beam.

21. The system as claimed in claim 19, wherein the optical amplifier is a fiber optic amplifier.

22. The system as claimed in claim 19, wherein the pulse stretcher and the compressor are both gratings.

23. The system as claimed in claim 19, wherein the optical amplifier is an all-fiber parabolic pulse amplifier.

24. The system as claimed in claim 17, wherein the means for generating includes an oscillator and an optical amplifier and wherein the oscillator and the optical amplifier are both fiber-based.

25. The system as claimed in claim 17, wherein the means for generating uses chirped pulse amplification.

26. The system as claimed in claim 17, wherein the means for generating uses parabolic pulse amplification.

27. The system as claimed in claim 24, wherein the means for generating uses FCPA.